

## **Title: Patterning through the Rainforest**

### **Brief Overview:**

The beginning lesson reviews the terms repeated pattern, core, and element as students create, extend, and rename patterns revolved around a rainforest theme. The second lesson has students listening to a “growing story” about the rainforest entitled “The Hut that Pablo Built”. During this lesson, students will create growing patterns with various objects from the story. In the third lesson, students will explore the use of growing number tables with the use of pattern blocks. For this lesson students need to be able to skip count by 2, 5 and 10.

### **NCTM Content Standard:**

Understand patterns and relations

- Describe, extend and make generalizations about geometric and numeric patterns
- Represent and analyze patterns using words and tables

### **Grade/Level:**

Grades 3-4

### **Duration/Length:**

Three 60 minute sessions

### **Student Outcomes:**

Students will:

- Identify, create, and extend repeating and growing patterns with more than four elements in its core
- Represent and analyze growing patterns using symbols, shapes, designs or pictures
- Represent and analyze the rules of growing patterns

### **Materials and Resources:**

Day 1

- Pattern Blocks
- 1 ball for the Engagement activity. Tape or write facts about the rainforest to the ball. See Teacher resource “Facts on the Rainforest”

- Student resources “Matching Patterns” and “Animal Patterns”. Copy on two different colors of paper. Cut out and put a set (one of each) of cards into each bag.
- Teacher resource “Matching Patterns Transparency”
- Student resource “Rainforest Wildlife Student Cards.” Cut cards apart and put into baggies (one bag per student).
- Teacher resource “Rainforest Wildlife Teacher Cards.” Cut apart and use with “Rainforest Wildlife Student Cards.”
- Sentence strip for every student
- Student resource “ Enrichment Cubes Activity”

#### Day 2

- Pattern Blocks
- Teacher resource “The Hut that Pablo Built”
- Tub of pattern blocks for each table
- Teacher resource “Growing Pattern Cards.” Cut out cards
- Teacher resource “Growing Patterns Assessment”

#### Day 3

- Pattern Blocks
- Teacher resource “Growing Pattern Table- Transparency”
- Student resource “Growing Pattern Table 2”
- Teacher resource “Growing Pattern Table 2 Answer Key”

### Development/Procedures:

#### Day 1

##### Pre-assessment

- Using pattern blocks, have the students independently create and extend a unique pattern that has three elements in its core. Have the students name their pattern in a different way and extend it.
- Tell students to use pattern blocks to create an abbc core and then repeat the core at least three times to create a pattern. Have students share another way their pattern can be represented. Students will then create an abac core. Have students share another way their pattern can be named. Observe the students and take appropriate notes about their ability to complete the assigned tasks.

##### Engagement

- Have the students stand in a circle and toss the “Rainforest ball” (see materials) back and forth as they skip count various number patterns. State the number to skip count by and have students toss and skip count as they catch the ball. The ball is then tossed to a student who gives the next number and he/she tosses the ball. When you say, “Stop,” the student holding the ball will read an interesting fact about the rainforest. Rainforest facts can be found on Teacher resource

- “Rainforest Facts.” Change the number to skip count by and counting continues with the last number that was called.

### Exploration

- Students are divided into pairs. Each pair is given a bag with a variety of rainforest animal patterns. Use student resources “Matching Patterns” and “Animal Patterns.” Have animal patterns on one color paper and the matching patterns on a different color paper. Students will match the pattern of rain forest animals to those of numbers, letters, and shapes. Circulate and monitor progress.

### Explanation

- Have a transparency of the matches made from the Exploration, and have the students explain why the two cards match. Use Teacher resource “Matching Patterns Transparency.” Review the terms, **repeating pattern** (sequences of items that repeat), **core** (part of the repeating pattern that repeats at least three times) and **element** (one term within a repeating pattern). For example, in our animal pattern, the frog represents one element.
- Explain to the students that they will be using four elements to create patterns. Distribute to each student a bag with student resource “Rain Forest Wild Life Cards,” and have them create a core pattern with four elements as you hold up the shape, number and letter pattern cards one at a time. Use Teacher resource “Rain Forest Wild Life Teacher Cards,” and have students create a pattern with their rainforest animals that matches the card being held. The students are asked to identify the core. Students then create their own animal patterns using four elements. Assist students in renaming the pattern in a variety of ways. Students will look at their animal pattern and state it in other ways (numbers, shapes, letters)

### Application

- Students choose animals from their bag to create a repeating pattern. Then they glue it to a sentence strip. Below the animals they write the animal pattern in two different ways using letters, numbers, or names.

### Differentiation

Reteach: Using various patterns (letters, shapes and numbers), students create different patterns with their animal cards. Ask the following questions: “How many birds did you use if you repeat the pattern three times?” “How many times are snakes represented in your repeating pattern?” Have students practice repeating various animal patterns using the letter, shapes and number pattern cards and ask questions about the core and its elements.

Enrich:

1. Students choose 24 cubes (using four different colors) to create their own unique pattern. The students then transfer their patterns to the student resource “Enrichment Cubes Activity” to note their observations. The following criteria will be addressed: describing the core, repetition of elements, and any other interesting information gathered from observing their pattern.

**Assessment:** Create a four element number pattern on the overhead. Students choose a method for representing the pattern (cubes, shapes, animals). Monitor student progress with creating the pattern.

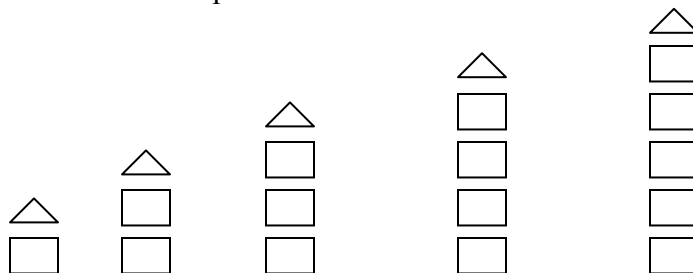
## Day 2

### Engagement

Read the story “The House that Pablo Built” and asks students if they observe any patterns in the story. Discuss what is happening as information is added to the story (the story is growing). Students are asked to identify the people mentioned in the story (Hunter, Actress, Pastor, and Traveler). Ask: “What can Pablo do to accommodate all of these people in his hut?”

### Exploration

- Distribute square and triangle pattern blocks to the students. Students will follow your model of creating Pablo’s hut using one square and one triangle.
- Students are told that each visitor to Pablo’s hut adds additional blocks. For every new visitor, a square block is added. Ask: “What will the hut look like when the hunter visits Pablo’s hut? What will the hut look like when the actress visits Pablo’s hut? When the pastor visits Pablo? When the traveler visits Pablo?”



- Ask the students: “How is Pablo’s hut changing?”

### Explanation

- Students are asked to identify the elements that are repeated. Students observe that something has been added each time a visitor came to visit Pablo’s hut. Students are asked to explain what is happening in the pattern. Students are guided into explaining that the pattern is growing.
- Teacher introduces the term, growing patterns. Students are told that a growing pattern is a pattern that builds onto the object(s) from the first level. Students are also told that a level is one full set of object(s) before reaching the next growing set of objects.

- Present a new growing pattern. Tell students that Pablo is adding tiles to his floor. Display Pablo's first three levels. Students are asked to use their knowledge of growing patterns to build the next two levels.
- Students work in pairs and are asked to explain how the pattern grew.
- Have students show how they created the next two levels.

### Application

- Students are placed into small groups and independently create their own growing pattern using pattern blocks. They then tell their group about their pattern, how it grew, and the number of levels that exist.

### Differentiation

Use the “Growing Pattern Cards” to both reteach and enrich your students. For those who need extra practice have them build the next two levels in the pattern. For the more able students, have them grow the patterns to various levels (7-10).

### Assessment:

Using teacher resource “Growing Patterns Assessment,” students will identify the missing levels of various patterns.

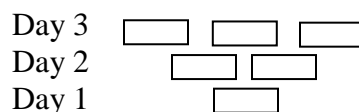
### Day 3

#### Engagement

Using the overhead and pattern blocks, create a pattern. Students will tell what type of pattern it represents (repeating or growing) and give an explanation. Make the second pattern type and ask students to identify and explain.

#### Exploration

- Distribute square pattern blocks to the students and present the following situation. Pablo planted grain and it grew into wheat. Use the overhead to model the square pattern block as a representation of the wheat plant on the first day. Add one more block for Day Two and three more blocks for Day Three. Students should use their square pattern blocks to make the plant for the first three days.



- Ask the following questions: “What will Pablo’s wheat plant look like on day seven? How many squares are in his plant?” Students use their blocks to grow the pattern and determine the answers. Ask students what they observe about the growing pattern (it is growing by one).

#### Explanation

- Using the teacher resource “Growing Pattern Table,” present a growing table with information displaying the levels and the number of blocks at each level.
- Students are guided into identifying the rate at which the levels grow. Using the rule, guide students as they find the missing number of blocks.

**Application**

- Instruct students to find a partner to complete three growing pattern tables using the student resource “Growing Pattern Table 2.” Students are given four tables with number of values missing at various levels. Students find the missing number of blocks. For each table, students will identify the rule. Answers may be found on an answer key.

**Differentiation****Reteach**

For students who are having trouble with the concept, work in small groups and review the growing number charts from today’s activity.

**Enrich**

Given a table representing growing patterns (student resource “Growing Patterns Chart 2”), students are asked to create their own word problem to match information on the chart. Students will write their problem on a separate sheet of paper.

**Assessment**

Students are randomly selected from each group to explain what they learned about growing and repeating patterns. Ask additional questions to check for understanding.

**Summative Assessment:**

Students will complete a BCR which evaluates students’ understanding of growing patterns.

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## Facts on the Rain Forest

The trees of a tropical rainforest are so densely packed that rain falling on the canopy can take as long as 10 minutes to reach the ground.

Some rainforest monkeys are omnivores, eating both animals and plants.

Flying animals of Asian rainforests include frogs, squirrels and snakes.

80% of the flowers in the Australian rainforests are not found anywhere else in the world.

Bats are essential for the pollination of many tropical foodstuffs such as bananas and mangos.

One out of four ingredients in our medicine is from rainforest plants.

In the moist rainforests of South America, sloths move so slowly that algae are able to grow in their fur.

An area of a rainforest the size of a football field is being destroyed each second.



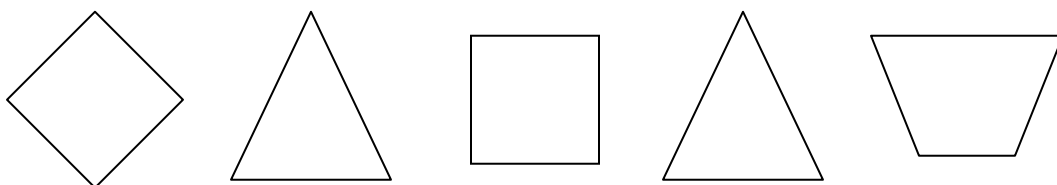
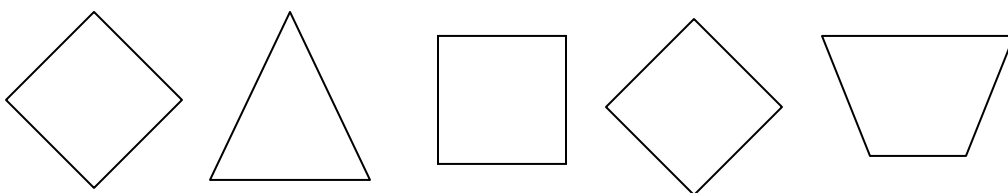
## Matching Patterns

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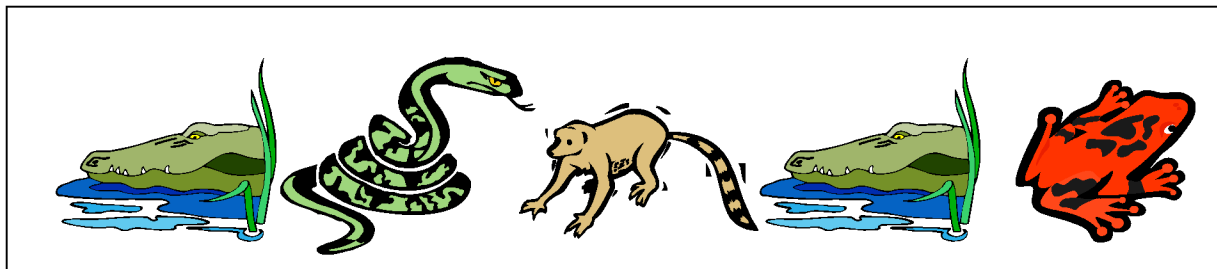
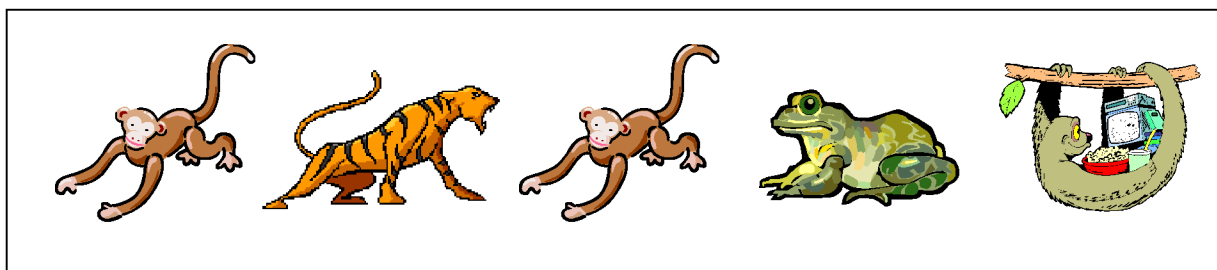
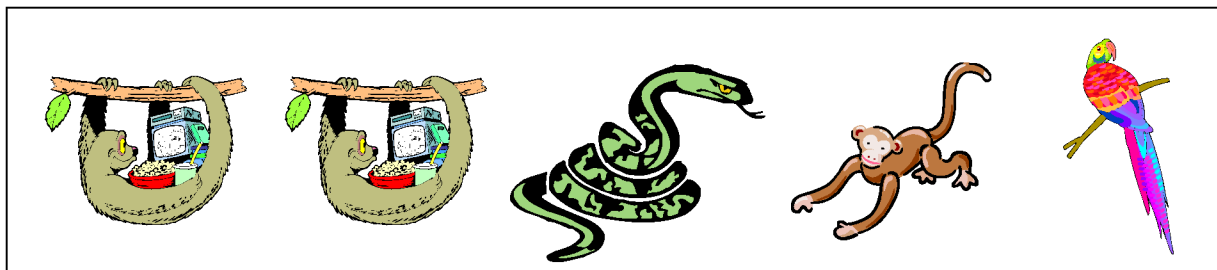
**A B C D D**

**1 2 3 1 4**

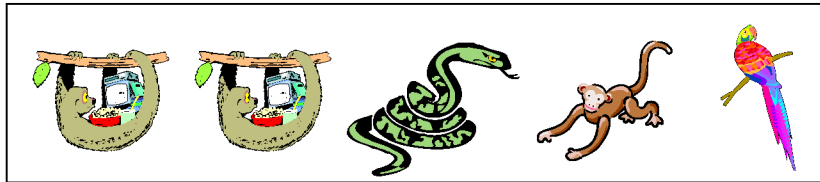
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# ANIMAL PATTERNS



## Matching Patterns Transparency – Answer Key



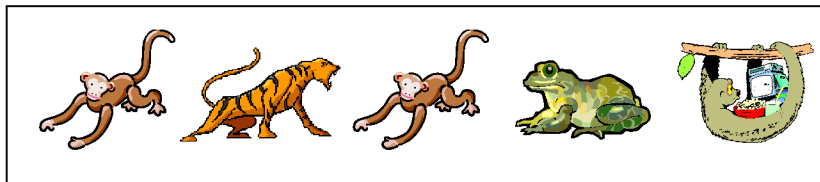
**A A B C D**



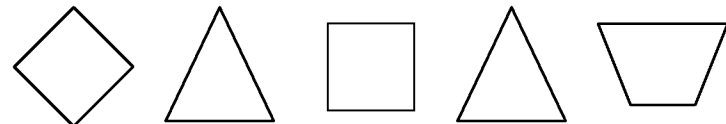
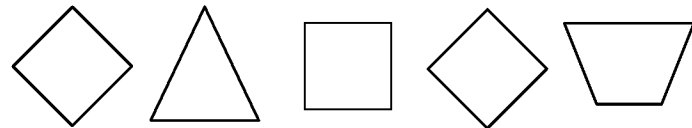
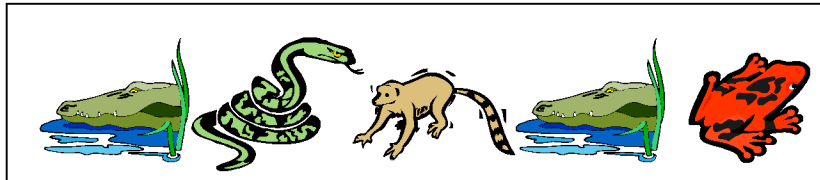
**A B C D D**



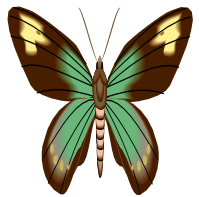
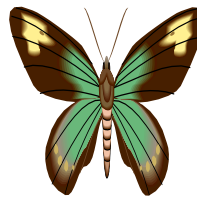
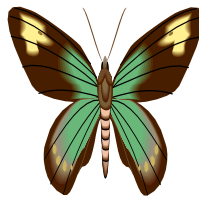
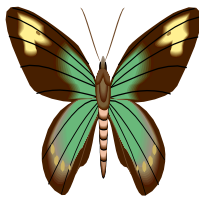
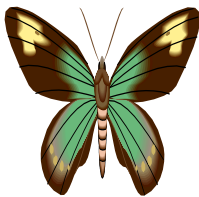
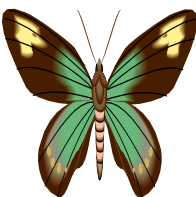
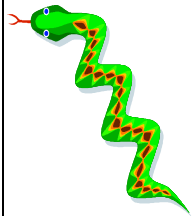
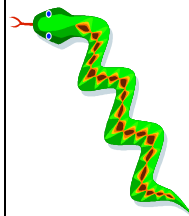
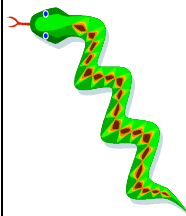
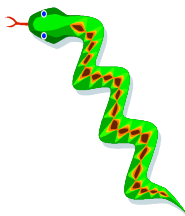
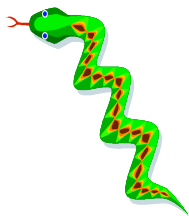
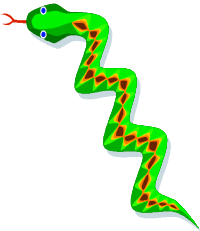
**1 2 3 1 4**



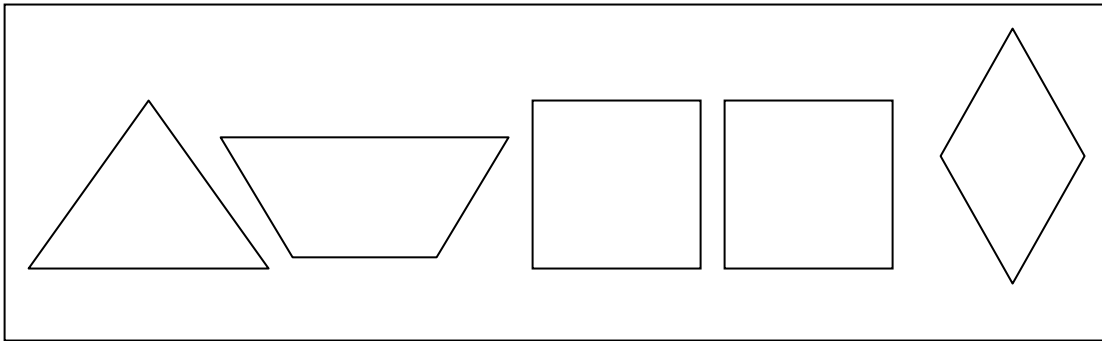
**1 2 1 3 4**



## Rain Forest Wild Life Student Cards



## Rain Forest Wild Life Teacher Cards



A B A C D

1 2 2 3 4

1 2 3 2 4

## Enrichment Cubes Activity

Name \_\_\_\_\_

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1. Describe the core of your pattern.

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2. What colors will be used if you added three more elements to your pattern?

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3. Is there anything else you observed?

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## Enrichment Cubes Activity- Answer Key

Name \_\_\_\_\_

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*Answers will vary...*

1. Describe the core of your pattern.

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4. What colors will be used if you added three more elements to your pattern?

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5. Is there anything else you observed?

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# **The Hut that Pablo Built**

This is the hut that Pablo built.

This is the grain that lay in the hut that Pablo built.

This is the parrot that ate the grain that lay in the house that Pablo built.

This is the snake that killed the parrot that ate the grain that lay in the hut that Pablo built.

This is the mongoose that worried the snake that killed the parrot that ate the grain that lay in the hut that Pablo built.

This is the monkey with the curly tail that tossed the mongoose that worried the snake that killed the parrot that ate the grain that lay in the hut that Pablo built.

This is the hunter all forlorn that hunted the monkey with the curly tail that tossed the mongoose that worried the snake that killed the parrot that ate the grain that lay in the hut that Pablo built.

This is the actress all dressed up and cute that kissed the hunter all forlorn that hunted the monkey with the curly tail that tossed the mongoose that worried the snake that killed the parrot that ate the grain that lay in the hut that Pablo built.


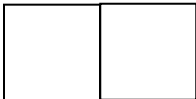

This is the pastor all shaven and shorn that married the actress all dressed up and cute that kissed the hunter all forlorn that hunted the monkey with the curly tail that tossed the mongoose that worried the snake that killed the parrot that ate the grain that lay in the hut that Pablo built.


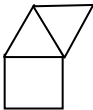
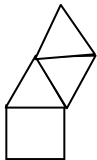
This is the macaw that crowed in the morn that waked the pastor all shaven and shorn that married the actress all dressed up and cute that kissed the hunter all forlorn that hunted the monkey with the curly tail that tossed the mongoose that worried the snake that killed the parrot that ate the grain that lay in the hut that Pablo built.

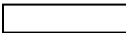
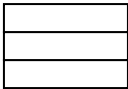

This is the traveler collecting seeds that kept the macaw that crowed in the morn that waked the pastor all shaven and shorn that married the actress all dressed up and cute that kissed the hunter all forlorn that hunted the monkey with the curly tail that tossed the mongoose that worried the snake that killed the parrot that ate the grain that lay in the hut that Pablo built.

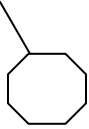
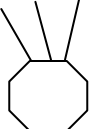
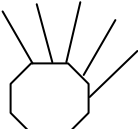




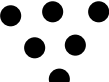
# Growing Pattern Cards



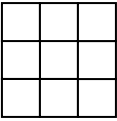
				
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Level 1	Level 2	Level 3	Level 4	Level 5





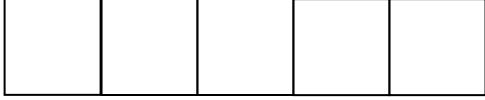
				
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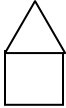
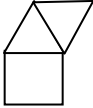
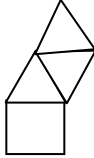
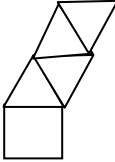
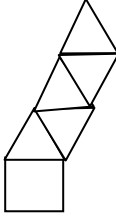
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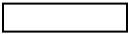
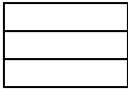
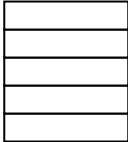
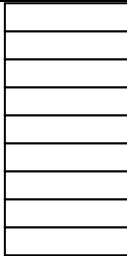
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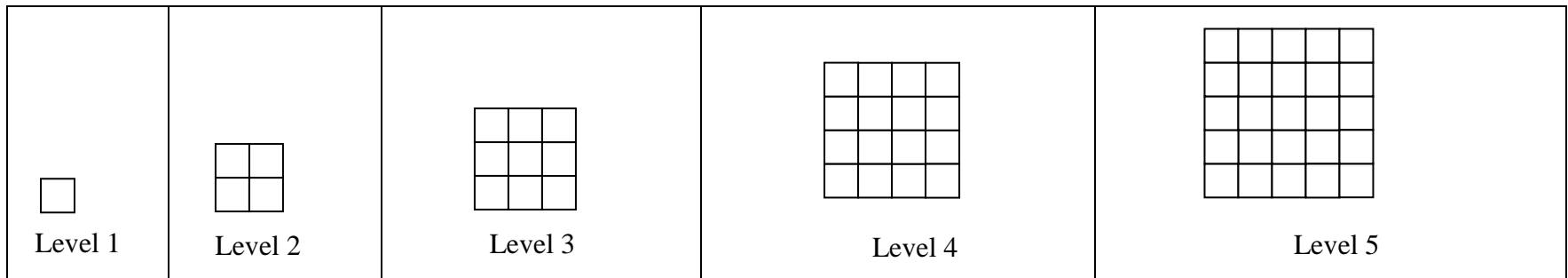
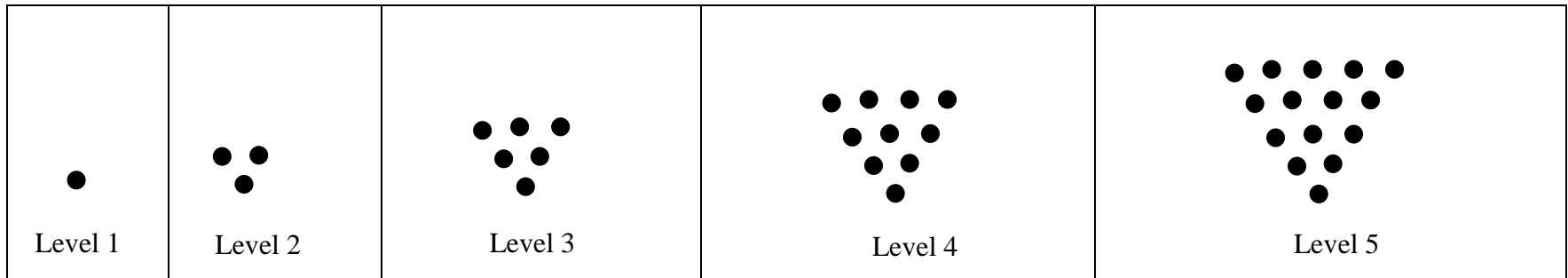
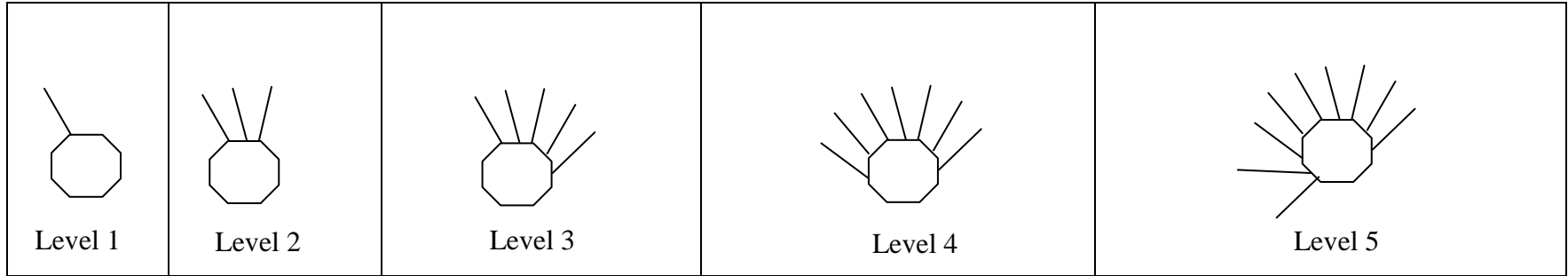
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## Growing Pattern Cards – Answer Key

				
Level 1	Level 2	Level 3	Level 4	Level 5

				
Level 1	Level 2	Level 3	Level 4	Level 5

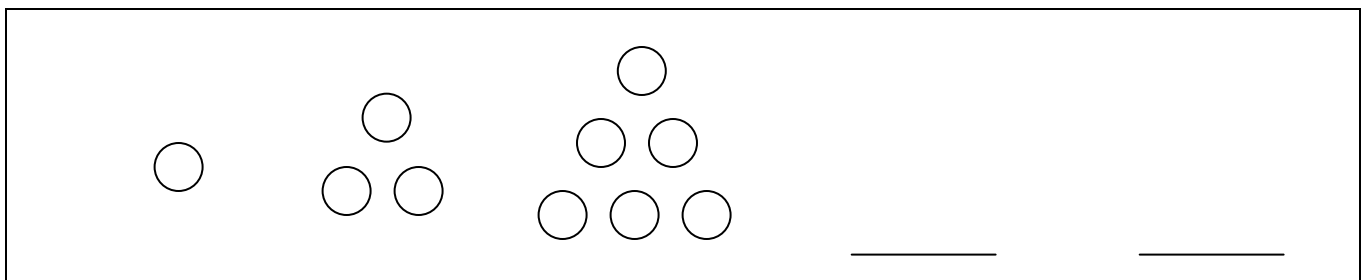
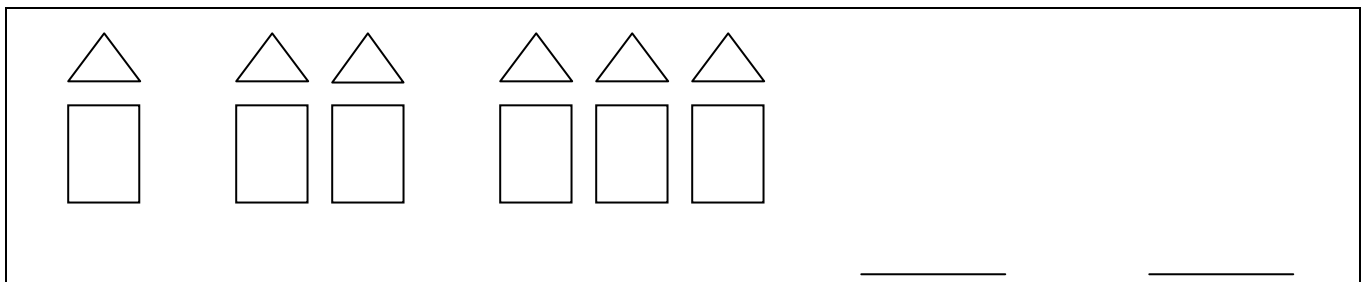
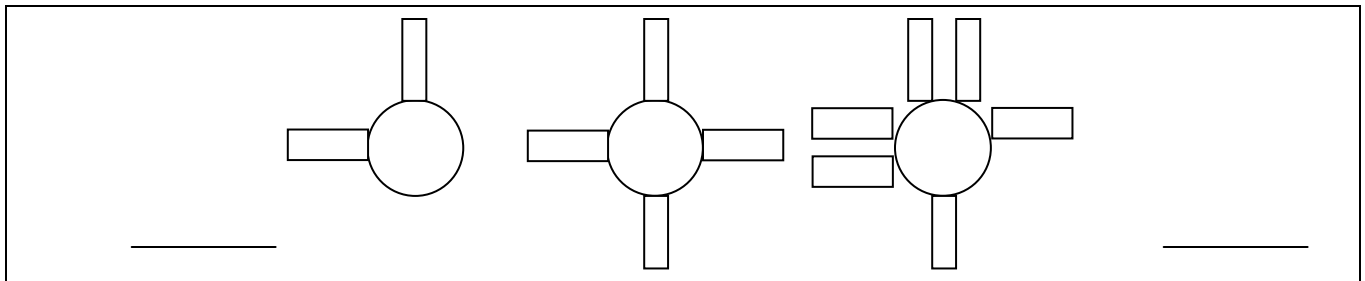
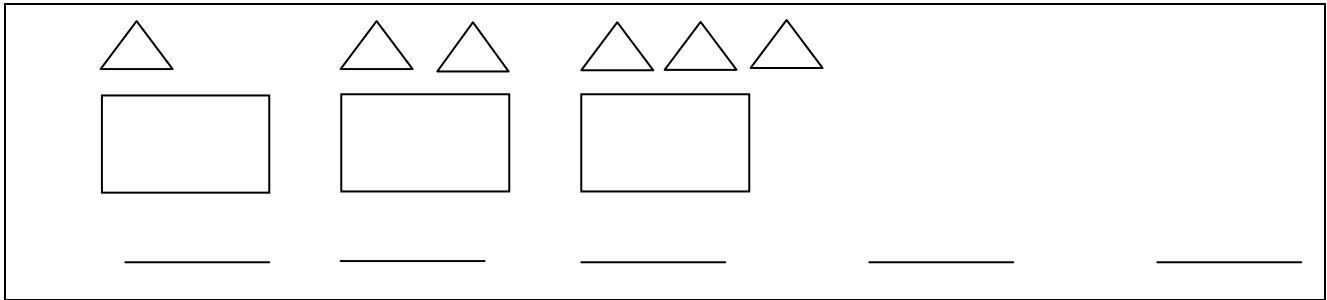
				<i>There will be 14 blocks</i>
Level 1	Level 2	Level 3	Level 4	Level 5



## Growing Patterns Assessment

Name \_\_\_\_\_

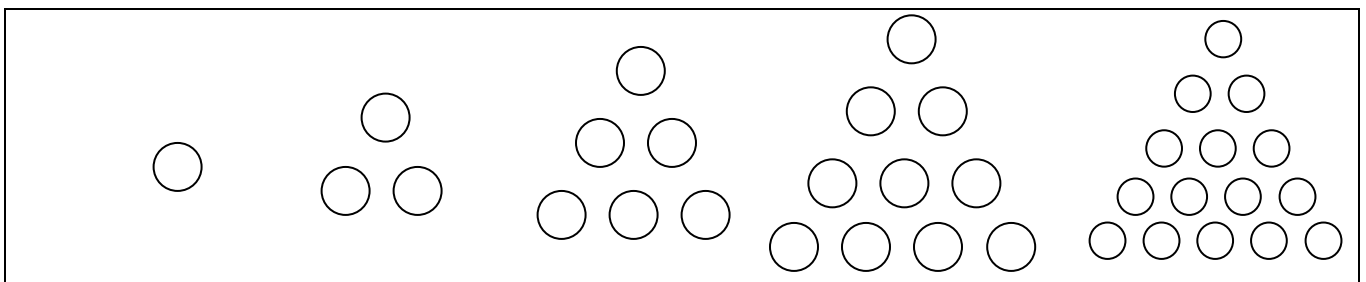
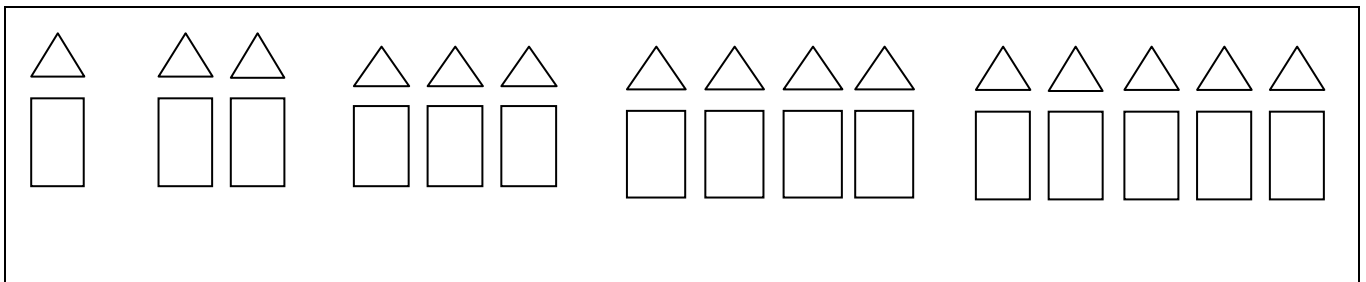
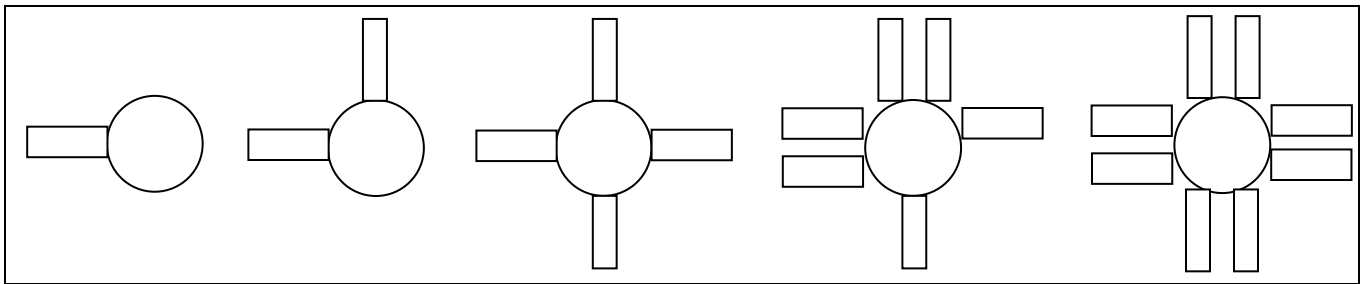
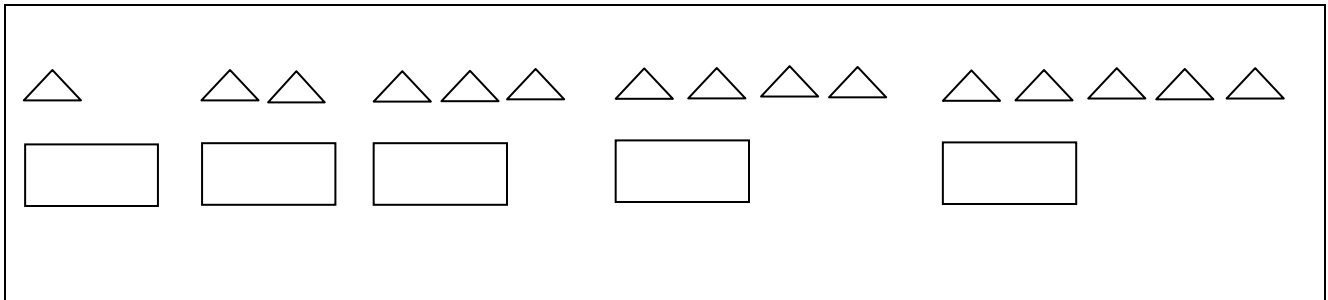
Look at the growing patterns below and draw the missing levels.



## Growing Patterns Assessment – Answer Key

Name \_\_\_\_\_

Look at the growing patterns below and draw the missing levels.



## Growing Pattern Table- Transparency

Level	Number of Blocks
1	3
2	5
3	8
4	12
5	
6	23
7	30
8	

### **Growing Pattern Table- Transparency Answer Key**

<b>Level</b>	<b>Number of Blocks</b>
1	3
2	5
3	8
4	12
5	17
6	23
7	30
8	38



## Growing Pattern Tables 2

Pattern +3

Level	Number of Blocks
1	5
2	8
3	11
4	14
5	
6	20
7	
8	26

Pattern +5

Level	Number of Blocks
1	7
2	12
3	17
4	
5	27
6	32
7	
8	

Pattern +4

Level	Number of Blocks
1	4
2	8
3	12
4	16
5	
6	
7	28
8	

Pattern +6

Level	Number of Blocks
1	8
2	14
3	
4	26
5	32
6	38
7	
8	

## Growing Pattern Tables 2- Answer Key

Pattern +3

Level	Number of Blocks
1	5
2	8
3	11
4	14
5	<b>17</b>
6	20
7	<b>23</b>
8	26

Pattern +5

Level	Number of Blocks
1	7
2	12
3	17
4	<b>22</b>
5	27
6	32
7	<b>37</b>
8	<b>42</b>

Pattern +4

Level	Number of Blocks
1	4
2	8
3	12
4	16
5	<b>20</b>
6	<b>24</b>
7	28
8	<b>32</b>

Pattern +6

Level	Number of Blocks
1	8
2	14
3	<b>20</b>
4	26
5	32
6	38
7	<b>44</b>
8	<b>50</b>

## MSA Extended Constructed Response Template

Students have completed repeating and growing patterns.

**Part A** For the next four weeks, Uncle Tom will give John coins for his money bank. On week one, John will get one penny and one dime. Each week he will get twice as many dimes as the week before, but the other coins will remain the same. What would his collection look like on week four?

## Part B

- Use what you know about repeating and growing patterns to explain why your answer is correct.

## **MSA Extended Constructed Response Template – Answer Key**

Students have completed repeating and growing patterns.

**Part A** For the next four weeks, Uncle Tom will give John coins for his money bank. On week one, John will get one penny and one dime. Each week he will get twice as many dimes as the week before, but the other coins will remain the same. What would his collection look like on week four?

*On week four John will have 4 pennies and 8 dimes.*

### **Part B**

- Use what you know about repeating and growing patterns to explain why your answer is correct.

*Each week the number of dimes will double, so week 2 has 2 dimes, week 3 has 4 dimes, and week 4 has 8 dimes. The number of pennies remains the same each week, so on week 4 he has 4 pennies.*